

(12) United States Patent

Xu et al.

(54) APPARATUS FOR CORRECTING UPWARD **DEFORMATION OF LARGE MEMBER OF** STAINLESS STEEL CAR ROOF

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References Cited U.S. PATENT DOCUMENTS

1,358,396 A * 11/1920 Robison 72/292 1,487,839 A * 3/1924 Claybourn 72/342.4 (Continued)

US 9,636,730 B2

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FOREIGN PATENT DOCUMENTS

CN CN 1137953 A 12/1996 2885486 Y 4/2007 (Continued)

OTHER PUBLICATIONS

International Search Report for corresponding International Patent Application No. PCT/CN2011/077052 mailed Oct. 20, 2011.

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(57)ABSTRACT

The utility model provides an apparatus for correcting upwarp deformation of a large member of a stainless steel car roof, being characterized in that, it has a crossbeam, end support columns, a middle support column, an arc-shaped positioning body, crossbeam pull rings, a thin steel taut strap, and tighteners. The end support columns, crossbeam, and middle support column constitute a supporting part, the arc-shaped positioning body having the same arc shape as an inner arc of the large member of the stainless steel car roof is arranged on the middle support column. The thin steel taut strap covers an exterior contour surface of the large member of the stainless steel car roof, and is connected via the tightener to the crossbeam pull rings respectively fixed at two ends of the crossbeam.

2 Claims, 1 Drawing Sheet

